BIOE 519: Biomaterials

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Spring 2014, MW 3:30 pm – 5:00 pm, BRC 285

Overview

Biomaterials covers the design and synthesis of materials which interact with biologic phenomena such as cell-free, microbial, and mammalian systems. Topics covered include: surfaces and surface functionalization, biomedical implants and their immune response, three dimensional cell culture systems, and regulatory hurdles (e.g., FDA clearance). The class will be rooted in a historical perspective, with a particular emphasis on the latest techniques in synthetic chemistry relating to biomaterials.

Office Hours

Contact Prof. Miller ahead of time if you would like to make use of office hours. Generally these will be the hour immediately following lectures, but I may be able to accommodate other times if you need.

Textbooks

Recommended textbooks: Biomaterials Science: 3rd Edition, Ratner, Hoffman, Schoen, Lemons. ISBN: 0123746264
40% off through Jan. 17th: Bioconjugate Techniques: 3rd Edition, Hermanson. ISBN: 9780123822406

Grading

Homework: 10%
4 Quizzes: 5% each
2 Exams: 10% each
Journal Article Presentation (March 24th – April 21st): 20%
Final Project (Due April 23rd): 20%
Participation: 10%

Regrade requests can be submitted to Prof. Miller within one week of receiving graded items, but keep in mind that the entire assignment/quiz/test will be regraded in its entirety (so additional points may be taken off if initial grading is deemed too lenient).

Homeworks

Homeworks will generally be 1-page summaries and scientific critiques of biomaterials-related primary research journal articles from the Literature. Up to two papers will be assigned per week, with the write-ups due on the date specified (typically one due per class the following week).

Quizzes

Quizzes will be in-class and will help hone your skills with biomaterials and your ability to interpret work ongoing in the field.

Tests

Tests will be **cumulative by subject unit** (with two units in the class). There is no Final exam.

Journal Article Presentation

Early in the semester, you will be assigned a date to present a **primary-research** journal article of interest to you in the field of biomaterials. The paper of interest must be submitted to Prof. Miller for approval at least 2-weeks before the presentation. If a suitable paper is not selected, the student will be assigned a suitable paper to present. Relevant papers in top journals with at least 4 figures are good guidelines to aim towards. Presentations will be in front of the class and should be no more than 30-minutes including time for questions. You should adequately explain background (explaining with figures from review papers where appropriate), hypotheses, approach, materials and methods, discussion, and your own critique of the paper. Your peers in the class will assist in discussion as well as with evaluating your presentation with formalized constructive feedback. **More information will be given mid-semester.**

Final Project

The final project (due April 23rd) will be a written report in which you propose to modify a current biomaterial or to design a new biomaterial. You should cover background, significance, approach, hypotheses, synthetic chemistry, and expected biologic function (whether *in vitro* or *in vivo*). This is an opportunity to be creative and further explore your favorite parts of the field. Students are allowed to propose biomaterials research that may be part of their thesis as long as it is new application of synthetic chemistry (i.e. do not propose something which has already been achieved in your lab by others). The topic you have selected (title and abstract) must be approved by Prof. Miller by March 23rd. **More information will be given mid-semester.**

Special Needs

Any student with a documented special need which may impact the above should speak to Prof. Miller within the first two weeks of class; discussions will remain confidential. Students should also contact Disability Support Services in the Ley Student Center.